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Running head: TASK-CONTINGENT CONSCIENTIOUSNESS

## Task-Contingent Conscientiousness as a Unit of Personality at Work

### Abstract

The present study examined the viability of incorporating task-contingent units into the study of personality at work, using conscientiousness as an illustrative example. We used experience sampling data from 132 managers to show that: (i) momentary conscientiousness at work is contingent on the difficulty and urgency demands of the tasks people are engaged in; (ii) there are significant and stable differences between people in the extent to which their conscientiousness behaviors are contingent on task demands; and, (iii) individual differences in task-contingent conscientiousness is related to, though distinct from, individual differences in trait conscientiousness. We also provide evidence in relation to (iv) need for cognition as a possible antecedent of task-contingent conscientiousness, and (v) adaptive performance on a cognitive task as a possible consequence of it. We discuss the theoretical implications of our findings for the cognitive nature of personality and the way in which conscientiousness is expressed at work. Practical implications in relation to the predictive function of personality and applications that focus on behavioral change are also discussed.

**Keywords:** conscientiousness, within-person variability, task-contingent personality units

## Task-Contingent Conscientiousness as a Unit of Personality at Work

Advances in the study of personality in organizational settings over the past 20 years have been based on the conceptualization of personality in terms of cross-situationally consistent and temporally stable traits. However, individuals also show large amounts of variability in their momentary responses across situations (e.g., Fleeson, 2001), a finding that is not well-accounted for by a purely between-person trait approach to personality. The present paper adopts a dynamic approach to the study of one personality variable that is highly relevant to work, namely conscientiousness. Although momentary conscientiousness itself is not the main focus of the present paper, we argue for the contingency of momentary conscientiousness on situational cues and propose that individual differences in these contingencies (a variable that we refer to as *task-contingent conscientiousness*) capture meaningful aspects of personality. Conscientiousness is the personality factor with the strongest validity for predicting performance across work contexts (e.g., Barrick & Mount, 1991; Barrick, Mount, & Judge, 2001; Salgado, 1997) and therefore provides a strong test of the potential usefulness of integrating contingent units into the study of personality at work. First, we provide a brief outline of previous research on personality at work and its emphasis on between-person trait differences. We then describe a more dynamic approach to personality that has started to emerge within the field in general. In the sections that follow, we outline some questions of interest that arise within this approach in relation to the conscientiousness dimension, and report the results of a study designed to address these questions.

## Personality at Work

The study of personality at work has seen a resurgence over the past two decades, a development that can be largely attributed to the conceptualization of personality in terms of the Five-Factor Model (FFM; McCrae & Costa, 1999). The factors of the FFM are

predominantly viewed as decontextualized traits that remain relatively stable over the life span and this is reflected both in the research questions that have been addressed and the research designs and methodologies that have been employed to study personality at work. In the typical study, differences between people in personality characteristics are related to between-person differences in important organizational outcomes such as job performance (e.g., Barrick & Mount, 1991), job satisfaction (e.g., Judge, Heller, & Mount, 2002), or leadership (e.g., Judge, Bono, Ilies, & Gerhardt, 2002). Some studies have investigated the moderating effects of situational characteristics, such as job autonomy, and the mediating effects of cognitive and motivational variables, such as goal setting, on personality-work outcome relationships (Barrick, Mount, & Strauss, 1993; Barrick & Mount, 1993; Barrick, Mitchell, & Stewart, 2003), using between-person designs and analyses. Similarly, more recent studies that have examined the predictive validity of broad versus narrow personality dimensions (e.g., Dudley, Orvis, Lebiecki, & Cortina, 2006), nonlinear personality-performance relationships (e.g., LaHuis, Martin, & Avis, 2005), or the interactive effects of multiple personality variables (e.g., Witt, Burke, Barrick, & Mount, 2002) are also based on a purely between-person approach.

The studies of between-person variability that have characterized the above literature have contributed to our knowledge of the stable situational and personality-related differences between people, and the effects of these variables on work outcomes of interest. However, individuals also display variability in their responses across situations (e.g., Fleeson, 2001). Previously, this variability has been viewed as generated externally from the personality system in studies of stable traits such as the FFM. However, to the degree that within-person variability in responses across situations is systematic, this variability may serve as the basis of units of personality that capture the dynamic aspects of individuals (Mischel & Shoda, 1995, 1998). Consistent with this view, a more dynamic approach has

started to emerge within the general personality literature which highlights the importance of integrating contingent units into the study of personality (e.g., Fleeson, 2001; Fournier, Moskowitz, & Zuroff, 2008).

### Dynamic Approach to Personality

In contrast to the focus on cross-situationally stable aspects of personality and between-person analyses that dominate within the organizational literature, research within the general personality literature has begun to focus on within-person variability (e.g., Fleeson, 2001; Fournier et al., 2008). This approach makes use of experience sampling methodology (Beal & Weiss, 2003) to assess the variability of the individual's momentary responses across different situations and the situational cues that trigger within-person changes. The exemplar of this approach is the Cognitive-Affective Personality System (CAPS) model proposed by Mischel and Shoda (1995, 1998) in which within-person variability is a function of situation-response contingencies of the form, "if this situation, then that response". The groundwork for the CAPS approach to personality comes from research conducted by Walter Mischel and colleagues (e.g., Mischel & Peake, 1982; Shoda, Mischel, & Wright, 1994; Wright & Mischel, 1987). Mischel and Shoda (1995, 1998) summarize empirical evidence that demonstrates individuals display large amounts of behavioral variability across situations and that this variability is an expression of a stable underlying personality system, which they conceptualize in terms of a set of mediating processes whose interactions result in predictable situation-behavior relations.

The contingent "if this, then that" relations that Mischel and Shoda (1995, 1998) hypothesized lead to the stable within-person aspects of personality reflect the same type of knowledge structures that cognitive psychologists have proposed as underpinning all forms of human behavior (Anderson, 1983). This knowledge may be in the form of procedural knowledge that typically exerts a direct influence on emotional and behavioral responses

without recourse to any conscious processing (Bargh & Gollwitzer, 1994; Anderson, 1983), such as has been employed as explanatory mechanisms for expertise (Ericsson & Charness, 1994), automatic processing (Bargh & Gollwitzer, 1994) and national culture (Markus & Kitayama, 1991; Peterson & Wood, 2008). . Alternatively, the underlying knowledge structure may facilitate consciously controlled processing of information and may be held in a declarative form that is available for conscious recall and oral expression. With regard to their development, the knowledge structures are acquired through repeated exposure to situations, actions and outcomes over a person's lifetime. The emotional and behavioral responses that come to represent an individual's personality may be learned through modeling, experimentation, instruction and other forms of guidance and reinforcement (Bandura, 1986). The development of knowledge structures may also be the product of biological and neurochemical influences, which can shape both the propensity for certain behaviors and emotions and the evaluations of outcomes as either rewarding or punishing.

The work by Mischel and others (e.g., Fleeson, 2007; Fournier et al., 2008) has established situation-response contingencies as meaningful aspects of personality, yet, to date, organizational researchers have been slow to take up such constructs as part of their research. Furthermore, although experience sampling methodology is increasingly being used to study dynamic phenomena within organizational contexts, this body of research has primarily focused on outcomes that are conceptually distinct from personality, such as momentary performance (Fisher & Noble, 2004), job satisfaction (Weiss, Nicholas, & Daus, 1999), organizational citizenship behavior (Ilies, Scott, & Judge, 2006), or well-being (Harris, Daniels, & Briner, 2003); where personality has been included in such studies, it has typically been conceptualized in terms of dispositional traits (e.g., Ilies & Judge, 2002; Ilies et al., 2006).

### Hypotheses Development

Although the dynamic approach to personality provides a broad meta-theoretical framework for studying dynamic aspects of personality, it does not specify the content of personality to be studied (Shoda & Mischel, 2006). In the present research we specifically focus on situation-response contingencies related to conscientiousness, with the purpose of investigating the extent and nature of such contingencies at work. The choice of conscientiousness as the content of interest is motivated by the relevance of this dimension within work settings. At the trait level, conscientiousness is the strongest personality predictor of job performance (e.g., Barrick et al., 2001; Hurtz & Donovan, 2000; Salgado, 1997). Many of the facets that characterize conscientiousness tap into behaviors that on face value are highly desirable for performance at work (e.g., competence, orderliness, achievement-orientation and self-discipline; see Costa & McCrae, 1992). In its broadest sense, conscientiousness encompasses variables that include a wide range of motivational tendencies (see Roberts, Chernyshenko, Stark, & Goldberg, 2005), including behavioral responses traditionally included in definitions of work motivation (e.g., Seo, Barrett, & Bartunek, 2004).

In our study, we distinguish between the expression of conscientious behavior at a given moment in time (which we refer to as momentary conscientiousness, see Fleeson, 2001) and conscientiousness as a trait that characterizes a general predisposition to behave conscientiously across different occasions. The latter describes a general characteristic of the person. Individual differences in trait conscientiousness, like other trait constructs, have been conceptualized in terms of internal factors such as differences in neurobiological variables (e.g., Depue, 1995). In contrast, momentary conscientiousness is not a stable property of the person but rather an unstable quality that at least partly reflects forces outside the person. Probabilistically, individuals who score high on trait conscientiousness are more likely than low scorers to express conscientious behavior at a given point in time (i.e., to score higher on



momentary conscientiousness); however, momentary conscientiousness may also vary within a person from occasion to occasion, for example in response to the demands of the situation. As such, conscientiousness expressed at a given moment in time is a behavioral response that can reflect the effects of underlying personality traits and/or situational factors, but the construct itself lies outside the personality system.

Although we do not conceptualize momentary conscientiousness as a personality variable, in the section that follows we argue that the extent to which an individual tends to adjust their level of conscientiousness in response to situational demands is an important aspect of personality. We identify these contingent situation-response units—which we refer to as *task-contingent conscientiousness*—with the “if-then” contingencies of the CAPS model. We hypothesize that individual differences in task-contingent conscientiousness represent stable differences between people, and therefore meet the litmus test of repeatability that is required for the inference of personality (see Fleeson & Nofle, 2008). Furthermore, we propose that these differences arise at least partly from processes other than those implicated in individual differences in trait conscientiousness, and therefore that individual differences in the task-contingent conscientiousness represent an aspect of personality that is distinct from differences in trait conscientiousness. Finally we explore one possible antecedent of task-contingent conscientiousness, namely need for cognition, and one possible consequence of it, namely adaptive performance on a cognitive task.

#### *The Contingency of Momentary Conscientiousness on Task Demand*

A core focus of the dynamic approach to personality is on the way in which individuals express their attributes across different occasions. Within this approach personality is conceptualized as “a flexible resource that supports adaptation to the moment” (Fleeson & Jolley, 2006, p.41). Thus, behavioral responses such as conscientiousness are seen in strategic terms: Individuals vary their level of conscientiousness across situations to

match the functional value of conscientious behavior for the situation. This viewpoint contrasts with the alternative possibility in which conscientious behavior is expressed indiscriminately or in erratic ways, as documented in studies of personality disorders (e.g., Widiger, 1993). Consequently, our first research question addresses the adaptability of conscientious behavior: In general, do individuals systematically vary their level of momentary conscientiousness in accordance with situational demands? A contingent approach to personality is justified to the extent that individuals do show discriminant responding across situations (Fleeson, 2007).

As a first step to addressing this question, one must identify the specific situational features that are likely to be relevant for the expression of momentary conscientiousness. Situations can be defined in many ways, including where and when they occur, who is present, and what activities are undertaken (Saucier, Bel-Bahar, & Fernandez, 2007). Tett and Burnett (2003) distinguish between three sources of situational cues that are likely to be relevant in work settings, namely the task at hand, other people and organizational characteristics. Whereas the tasks that individuals engage in and the people they interact with are likely to vary across the workday, organizational characteristics tap into macro-level factors that are unlikely to vary from day to day (e.g., policies, reward structures). In the present study we focus on the task as the source of situational variability. Although there is little knowledge about the situational features that explain within-person variability in momentary conscientiousness (Fleeson, 2007), there is good reason for expecting task characteristics to be a relevant source of situational variability for this dimension. The conscientiousness factor has been explicitly defined in terms of its task facilitation properties (e.g., John & Srivastava, 1999), and inventories designed to operationalize the FFM consistently identify conscientiousness as directly relevant to the way in which individuals approach and complete tasks (e.g., Costa & McCrae, 1992; Pryor & Taylor, 2000).

Furthermore, empirically, momentary conscientiousness has previously been shown to increase strongly as the situation becomes more task-oriented, whereas it is unrelated or only weakly related to other situational characteristics such as the friendliness, status or anonymity of the people present (Fleeson, 2007).

A second issue in characterizing situations involves the distinction between *nominal* and *psychological* features of the situation. Nominal features are diverse and include the where, what and who of the situation (e.g., giving a presentation at work to a group of colleagues, writing an email at your desk). Due to their specificity, the effects of nominal features are of limited generalizability (Mischel & Shoda, 1995). Furthermore, nominal features do not capture the meaning of the situation for the individual. Consequently, the same nominal feature can have different effects on behavior for a given individual depending on how it is interpreted. In contrast, psychological features describe situations in terms of their functional equivalence across different nominal features (e.g., the perceived difficulty of a task), and therefore generalize across a broad range of situations. Also, as noted by Fleeson (2007), this approach is a dimensional one in that situations are represented in terms of degrees of a characteristic, and consequently situation-response contingencies can be operationalized as regression slopes that have direction and graded magnitude.

In the present study we focus on two psychological dimensions of tasks that are likely to exert a strong influence on the expression of momentary conscientiousness, namely task difficulty and task urgency. We propose that these characteristics encourage conscientious behavior by increasing the demands that the task makes on the individual's psychological resources. We assume that over time individuals are exposed to and perform a variety of tasks at work. Furthermore, they observe work colleagues experiencing and responding to similar tasks. As a result of these direct and observational experiences and their observations of the consequences of different responses, individuals learn to differentiate between tasks based on

their demand levels and to produce behaviors that represent functional responses to those demands. Conscientious behaviors such as effort, efficiency, self-discipline and orderliness will typically be a functional way of responding to difficult or urgent tasks as they allow the individual to cope with the increasing workload and immediacy requirements signalled by task difficulty and urgency (Capa, Audiffren & Ragot, 2008; also see Bluedorn & Denhardt, 1988). Moreover, given that the volitional and self-regulatory behaviors that are encompassed by conscientiousness are based on a limited resource (see Baumeister, Bratslavsky, Muraven, & Tice, 1998), it will generally be adaptive to conserve this resource by decreasing conscientious behavior when tasks become less difficult or urgent. Consequently, if personality does represent an adaptive entity, as is assumed by the dynamic approach (e.g., Fleeson & Jolley, 2006), then individuals should typically express greater levels of momentary conscientiousness when completing difficult or urgent tasks than when completing easy or nonurgent tasks.

*Hypothesis 1.* Within-person variability in momentary conscientiousness is contingent on the difficulty and urgency demands of the tasks encountered at work. Momentary conscientiousness will typically be higher when tasks are perceived as more demanding and lower when tasks are perceived as less demanding.

#### *Between-Person Differences in Task-Contingent Conscientiousness*

; Hypothesis 1 is a test of the main effect of task demand on conscientious behavior; it addresses how the *typical* person responds to increasing levels of task demand. However, the validity of a contingent approach to personality also requires that individuals differ from each other at least in the magnitude (if not in the direction) of their contingencies. In the absence of such between-person variability in task-contingent conscientiousness, the contingent effect could simply be the result of species-typical patterns of responding, and therefore not strictly within the domain of personality. Furthermore, as between-person variability in task-

contingent conscientiousness can arise simply as a result of random variation, it is important to demonstrate that any observed individual differences reflect (at least partly) enduring qualities of the individual. That is, individuals need to show some stability in their task-contingent conscientiousness if one is to treat the contingencies as units of personality (see Fleeson & Nofle, 2008).

According to the CAPS model, the stability of task-contingent effects within a given person results from stabilities in the way information is processed. The model presents a connectionist framework in which the underlying personality system for a given person is represented as a set of interconnected cognitive and affective units (conceptualized broadly to include beliefs, expectancies, goals, emotions, self-regulatory competencies and other mental representations) that mediate the relationship between situations and behavioral responses (see Mischel, 2004). Specifically, within a given individual, situations are encoded for their salient features which then activate the mediating cognitive and affective units. The units interact dynamically and influence each other reciprocally through the network of stable connections, the results of which manifest as overt behavior. The organization of the mediating units captures the knowledge structure underlying the person's behavior. In this regard, the knowledge structure comprises a set of connections that represent the sequence of mental steps involved in producing a given response in a given situation (Linville & Clark, 1989). For example, an employee who has to submit a report by the end of the day may encode the task as being urgent, which in turn activates thoughts of failure to meet the deadline and its anticipated consequences, feelings of anxiety, and the goal of removing the anxiety by taking actions to meet the deadline. The latter avoidance goal may then trigger the execution of conscientious behaviors such as orderliness and effort as a way of meeting the deadline. Together, the set of thoughts, feelings and actions represents the person's strategy for adapting to the task demand (see Cantor, 1990).

Situation-response contingencies develop over time through a cognitive process that converts relevant knowledge gained from one's previous experiences into procedures for responding to situations (see Linville & Clark, 1989). Furthermore, as people have different neurobiological predispositions and different developmental histories they develop different knowledge bases for similar situations, which leads to individual differences in the encoding and responding to the same objective situation. In the CAPS model, these individual differences in information processing are represented as (i) differences in the accessibility of particular cognitions and affects, and (ii) differences in the structure of the interconnections among units. That is, people differ with respect to the ease with which specific thoughts, feelings, goals and other mental representations are activated, and the extent to which mental representations activate or deactivate other mental representations in the system. Thus, one individual may display a strong contingency between task demand and conscientious response because relevant mediating units such as thoughts of failure, feelings of anxiety, and failure avoidance goals are easily activated within the person, and/or because the links between the mediating units are strong (e.g., feelings of anxiety are strongly connected to avoidance goals which in turn are strongly related to conscientious responses); whereas a second individual may display a weak contingency because the relevant mediating units are less easily activated within that person or because the connections between mediating units are less well-developed. In this way, differences in the accessibility and organization of cognitive and affective units between people result in task-contingent conscientiousness effects that differ between people but that are stable within the person.

*Hypothesis 2.* There are significant and stable differences between people in task-contingent conscientiousness. That is, some individuals will be more likely than others to adjust their level of momentary conscientiousness in response to changes in task demands.

*Trait Conscientiousness and Need for Cognition as Antecedents of Task-Contingent Conscientiousness*

Within the CAPS model, the distinctive organization of cognitive and affective units that produces situation-response contingency patterns develops over time as the product of biological and social cognitive learning factors. Individual differences in biochemical and genetic variables predispose individuals to different sensory, perceptual, cognitive, affective and behavioral potentialities that provide the capacity for adaptive behavior and that set limits on what can be achieved (Mischel, 1999). These biological predispositions underlie the cognitive processing capacity that interacts with one's actual and observational experiences to influence the contingent patterns of responding that emerge over time, including the task-contingent conscientious behaviors examined here. In the present study we examine two potential antecedents of task-contingent conscientiousness—trait conscientiousness and need for cognition—that serve as indices of the types of biological and social cognitive learning factors that are presumed to influence contingent patterns of responding.

There are at least two reasons for including trait conscientiousness in our analysis. First, there is a conceptual basis for expecting trait conscientiousness to (inversely) influence task-contingent conscientiousness. Specifically, trait conscientiousness has been identified with a central nervous system variable that influences the ease with which behavior is elicited from changing environmental stimuli by influencing the minimum thresholds required for response facilitation (Depue, 1995). Individuals who are high on trait conscientiousness are thought to have higher thresholds at which changes in stimuli evoke behavioral, affective and cognitive responses and consequently are less reactive than individuals low on trait conscientiousness (e.g., Depue & Collins, 1999). This inhibitory effect of trait conscientiousness is reflected in the greater self-control, constraint and deliberation of the highly conscientious (e.g., Costa & McCrae, 1992), but can also manifest in terms of rigidity

or a lack of flexibility and expediency (e.g., Griffin & Hesketh, 2005). Conceptually, this has been equated with an overall constraint on the level of activation between units in a CAPS representation of a person (Read & Miller, 2002). In short, although highly trait conscientious individuals may experience higher levels of momentary conscientiousness on average, they are also less likely to adjust their conscientiousness downwards in response to a lowering of the task demands.

Second, in order to justify incorporating task-contingent conscientiousness as a distinct unit of personality, it is important to demonstrate that the information provided by the contingencies is non-redundant when taking into account the associated trait. In this regard, although the CAPS model does not preclude the possibility that contingent patterns of responding will be influenced by the type of neurobiological variables that are presumed to be indexed by trait measures, a central claim of the model is that task-contingent units capture elements of personality that go beyond the mere effects of traits. As a social cognitive theory of personality, the CAPS perspective emphasises the highly cognitive nature of personality. People come to be who they are largely as a result of learning processes in which they transform their direct and observational experiences into internal models that guide their behaviors and that are the basis of contingent patterns of responding (Bandura, 1986). The relevant processes for facilitating such learning effects include cognitive processes that go beyond the generalized reactivity effects of trait conscientiousness. Consequently, an assumption deriving from the CAPS model is that stable between-person differences in trait-contingent conscientiousness will remain after the effects of trait conscientiousness are controlled.

*Hypothesis 3a.* There will be a negative relationship between trait conscientiousness and task-contingent conscientiousness. That is, individuals who score high on trait



conscientiousness will be less likely than low scorers to adjust their level of momentary conscientiousness in response to changes in task demands.

*Hypothesis 3b.* There will be significant and stable differences between people in task-contingent conscientiousness that remain after controlling for trait conscientiousness.

In line with our cognitive interpretation of task-contingent effects, we propose the individual difference variable *need for cognition* as a second potential antecedent of task-contingent conscientiousness. Need for cognition describes an individual's tendency to enjoy and engage in effortful cognitive activity (Cacioppo & Petty, 1982). High scorers are more likely than low scorers to make sense of the world by employing deliberative processing strategies that involve actively seeking, acquiring, thinking about and evaluating social information (Cacioppo, Petty, Feinstein, & Jarvis, 1996). These individuals are intrinsically motivated to engage in the types of cognitive learning processes that facilitate the development of the knowledge structure underlying task-contingent effects. For example, selective attention plays a key role in contingency learning. In this regard, individuals who have a high need for cognition are more likely than low scorers to exclusively devote their attention to the object of attention (Osberg, 1987) and to selectively attend to information based on its quality (Cacioppo et al., 1996). Furthermore, high scorers spend more time elaborating on information and therefore have higher levels of information retention (e.g., Cacioppo, Petty, & Morris, 1983), and this too is an important subprocess in contingency learning (see Bandura, 1986).

Due to their greater information processing efforts, individuals with a high need for cognition are likely to develop richer knowledge structures with greater integration among the constructs in memory (Petty, DeMarree, Brinol, Horcajo, & Strathman, 2008). Using the language of the CAPS model, these individuals can be said to have mediating cognitive and

affective units that are more accessible (i.e., have lower thresholds of activation) and interconnected than the knowledge structures of low scorers (see Petty et al., 2008). Empirically, several sources of evidence support this assertion. For example, compared to low scorers, high scores have stronger links between their moods and their thoughts (e.g., Petty, Schumann, Richman, & Strathman, 1993), their thoughts and their attitudes (see Cacioppo et al., 1996), and their attitudes and their behaviors (e.g., Cacioppo, Petty, Kao, & Rodriguez, 1986). They report less uncertainty about the nature of cause and effect relationships in the social world (e.g., Weary & Edwards, 1994) and possess more complex schemata for explaining human behavior (Fletcher, Danilovics, Fernandez, Peterson, & Reeder, 1986). They are also more prone to the effects of subtle priming cues on behavioral and attitudinal responses (e.g., Petty et al., 2008).

Given the greater accessibility and interconnectivity of cognitive-affective units among individuals high on need for cognition, it follows that changes in situational cues are more likely to activate the mediating units in these individuals, and that once a construct has been activated it is more likely to impact other mediating units in the system, ultimately resulting in a behavioral response to the triggering cue. Consequently, to the extent that adjusting conscientious behavior to fit with the level of task demand represents an adaptive pattern of responding, individuals high on need for cognition should display higher levels of trait-contingent conscientiousness. We are not aware of any studies that have directly tested this hypothesized effect of need for cognition, however some supporting evidence comes from a study conducted by Evans, Kirby, and Fabrigar (2003). In that study, need for cognition was found to correlate strongly ( $r = .59$ ) with a self-report measure of *adaptive control*. Indicatively, the latter scale assesses an individual's situationally-conditional use of self-regulatory behaviors and contains many items that ask about the contingency of such

behaviors on task requirements (e.g., “I place a lot of importance on adjusting my study methods to meet the requirements of particular tasks”, see Cantwell & Moore, 1996).

*Hypothesis 4.* Need for cognition will be positively related to task-contingent conscientiousness. That is, individuals who score high on need for cognition will be more likely than low scorers to adjust their level of momentary conscientiousness in response to changes in task demands.

#### *Performance Consequences of Task-Contingent Conscientiousness*

A final aim of the present study is to provide data in relation to the performance consequences of task-contingent conscientiousness. Conceptually, task-contingent conscientiousness captures information about the adaptability of individuals. Individuals who score high on this variable are more likely than low scorers to differentiate between tasks in terms of their demand levels and to alter their level of momentary conscientiousness in response to changes in task demands. This pattern of responding aligns with the criterion construct of *adaptive performance*, which has been defined in terms of the performance that results when a person adjusts their behavior to fit the changing demands of the situation (see Stokes, 2008). Consequently, within work settings, task-contingent conscientiousness is likely to be of most relevance for predicting measures of adaptive performance.

The literature on adaptive performance is diverse and includes different approaches to conceptualizing and operationalizing the construct. One approach defines the construct broadly to include various dimensions that are assessed using self-report scales, such as creative problem solving, interpersonal adaptability, cultural adaptability and physically-oriented adaptability (Pulakos, Arad, Donovan, & Plamondon, 2000). A second perspective that is more closely aligned with our approach conceptualizes adaptive performance as performance under shifting task contexts, and operationalizes it using performance tasks that are administered under increasing complexity conditions (e.g., Kozlowski et al., 2001; Le

Pine, Colquitt, & Erez, 2000; Mumford, Baughman, Threlfall, Uhlman, & Costanza, 1993).

Within this approach, psychological processes that boost motivation in the face of increasing task complexity are seen as key for performing adaptively. An increase in task complexity makes greater demands on the psychological resources of individuals in that they need to transfer their knowledge from the simpler tasks to the more complex ones (Kozlowski et al., 2001) and to relearn how to do the task in light of the change (Le Pine et al., 2000).

Individuals can be said to be performing adaptively to the extent that they maintain their performance level following the increase in task complexity. One way in which this is achieved is through an increase in conscientiousness-related behaviors such as effort, perseverance, attentiveness, and methodicalness (Le Pine et al., 2000). Conversely, if individuals fail to adjust their level of effort and focus commensurate with the increase in task complexity then decrements in performance are likely to ensue. Given that task-contingent conscientiousness describes the extent to which an individual's conscientious behavior is responsive to changes in task demands, we expect high scorers will display higher levels of adaptive performance than low scorers.

We note that the approach to adaptive performance that we adopt here is an individual differences one. Within this perspective, the aim is to examine the stable characteristics of people that distinguish between adaptive and non-adaptive individuals (see LePine et al., 2000). For example, previous research has found that individual differences in cognitive ability and creativity-related traits are positive predictors of adaptive performance (Le Pine et al., 2000; Mumford et al., 1993). We contend that by capturing information about stable differences in the ways in which individuals motivationally respond to changing task demands, trait-contingent conscientiousness will also serve to distinguish between individuals who are and are not likely to perform adaptively. Specifically, we hypothesize:

*Hypothesis 5.* Task-contingent conscientiousness will positively predict adaptive performance. Individuals who have higher levels of task-contingent conscientiousness will be more likely than low scorers to maintain their performance in the face of increasing task complexity.

## Method

### *Overview*

The present research was conducted in the context of an ongoing long term training and development program for midlevel managers from several large multinational companies. As part of the overall program, the managers attend three-day residential modules approximately every six months. At the modules they participate in activities such as listening to lectures, completing learning tasks, receiving feedback on their performance, giving presentations, and participating in team building exercises. In between modules the participants complete various field-based activities. The data for the present study was collected as part of the residential modules and as part of a three-week experience sampling field study that participants completed between modules.

### *Participants*

The participants were 132 managers (76 men and 56 women) from four large companies. Sixty of the participants worked for an insurance company, 52 worked for an international airline, 13 worked for a broadcasting corporation, and 7 worked for a bank. Upon joining the program the average participant was 33.64 years old ( $SD = 6.07$ ) and had 4.81 ( $SD = 4.30$ ) years of management experience. The majority of participants either had an undergraduate ( $n = 55$ ) or postgraduate ( $n = 35$ ) level of education, and a further 21 reported a high school education. Twenty-one participants either selected ‘other’ or else did not report their level of education. Nine participants who responded to fewer than one out every five experience samples were subsequently omitted to maintain data quality.

### *Procedure*

As part of their first module, participants completed trait-based measures of personality, including the personality scales that are included in the present study. In this module, they also completed a cognitive task that served as the basis of the test of Hypothesis 5. Six months later, during their second module, participants were introduced to experience sampling as a methodology for capturing the dynamic aspects of personality. As part of this 3-day module the majority of the participants completed experience sampling questionnaires approximately every 60 to 90 minutes that served to familiarize them with the methodology and that were used as pilot data for research purposes. Subsequently, in the intervening period between the second and third modules, participants completed the field-based experience sampling activity that forms the basis of data reported in the present paper.

To implement the experience sampling activity, each manager was provided with a handheld computer that they carried with them over a three-week period at work. The managers were briefed on how to use the devices and provided with a written set of instructions that they could refer to. Five times each workday between the times of 9am and 7pm the devices' alarms would ring and a message would pop up to signal to the participants that it was time to complete an experience sampling questionnaire (which took approximately two minutes to complete). The signals occurred randomly within each two hour period (e.g., 9am-11am, 11am-1pm, etc.) with the constraint that the signals were no less than one hour apart and no more than three hours apart. The participants were informed that they had a 30-minute response window in which to respond to each signal, and that if they were unable to do so within this time period that they should wait for the next signal. They were also given details of who to contact in case their device malfunctioned or if they had any questions during the study period. The handheld computers were collected at the end of the three-week period and the managers were presented with detailed feedback reports at their next module.

In total, 4,931 signals were responded to, corresponding to an average of 40 responses per person (response rate = 53%). Sixty-nine of the responses were subsequently omitted due to missing data, resulting in a final total of 4,887 responses.

### *Materials*

*Experience sampling items.* The experience sampling questionnaire consisted of four items that assessed the participant's momentary conscientiousness and two items that assessed the perceived task demand characteristics (task difficulty and task urgency), as well as a series of other items that were not part of the present study. The questionnaire directed individuals to think of the task they were currently engaged in and to respond to each item with that task in mind. The momentary conscientiousness items assessed the individual's level of task efficiency ("How efficiently are you working on this task"), task systematicity ("How systematically are you approaching this task"), task effort ("How hard are you working on this task") and task focus ("How focussed are you on this task"). These items were chosen because they provide a relatively broad representation of the facets within the conscientiousness domain (given the constraint on the number of items that can feasibly be incorporated in an experience sampling study) and that are relevant as descriptors of how conscientiousness manifests in the context of work tasks. Efficient, systematic and hardworking are characteristic attributes of the conscientiousness dimension and have been included in several previous brief measures of the construct (e.g., Fleeson, 2001; Saucier, 1994). Task focus has less often been included in measures of the dimension, however conceptually it taps into aspects of conscientiousness related to self-discipline, such as avoiding distractions and not procrastinating. The task demand characteristics assessed task difficulty ("How difficult is this task for you") and task urgency ("How much time pressure are you experiencing while performing this task"). Each item was responded to on a seven-

point scale from “Not at all” or “None at all” (scored as 0) to “Extremely” or “A lot” (scored as 6).

To assess the dimensionality underlying the six items at the within-person level, we performed a P-factor analysis (see Borkenau & Ostendorf, 1998) of the within-person correlations among the items, using the pilot data collected in the module. The analysis provided support for two underlying dimensions, the first of which was defined by the four momentary conscientiousness items (loadings: focus = .77, efficiency = .70, effort = .58, and systematicity = .55), and the second of which was defined by the two task demand characteristics (loadings: difficulty = .86 and urgency = .54). A replication of the analysis using the field data yielded similar findings: One factor was defined by the items efficiency (.92), systematicity (.80), focus (.77) and effort (.54), and the other by the items difficulty (.86) and urgency (.80). These results provide support for the distinctiveness of the task demand and momentary conscientiousness dimensions, and suggest that a reliable index of each dimension can be obtained by aggregating the items that load on each factor. Consequently, we aggregated the two task characteristic items to obtain an aggregated measure of task demand (Cronbach  $\alpha$  = .74), and combined the other four items to assess momentary conscientiousness (Cronbach  $\alpha$  = .80).

*Trait conscientiousness.* As part of baseline assessments, participants had completed Goldberg’s 50-item IPIP measure of the NEO personality inventory (see Goldberg, 1999). The items were responded to on a visual analog (slider) scale that was anchored by the labels “strongly disagree” (scored as 0) to “strongly agree” (scored as 100). The 10-items that constituted each scale were averaged (after reverse coding the appropriate items) to obtain scores for each of the five dimensions. In the present study we included participants’ scores on the conscientiousness scale as a measure of their level of trait conscientiousness. To obtain scores that were within a similar range to the experience sampling item scores, the trait scores



were rescaled so that the minimum and maximum possible values were 0 and 6 ( $M = 4.13$ ,  $SD = 0.85$ , Cronbach  $\alpha = .87$ ).

*Need for cognition.* Need for cognition was assessed using the 18-item short-form of the need for cognition scale (Cacioppo, Petty, & Kao, 1984). The items were responded to on a visual analog (slider) scale that was anchored by the labels “strongly disagree” (scored as 0) to “strongly agree” (scored as 100). Individuals’ scores on the 18 items were averaged (after the appropriate reverse coding) and rescaled so that the minimum and maximum values were 0 and 6 ( $M = 4.08$ ,  $SD = 0.56$ , Cronbach  $\alpha = .84$ ).

*Adaptive task performance.* The participants completed an untimed task in which they were presented with 25 problems that each required them to select the next two letters in a series of letters according to the rule that is embodied by the series. Task complexity was manipulated by varying the number of operations underlying sequence change for different problems. Specifically, the complexity of the problems increased progressively such that the first five problems required the identification of a single operation (e.g., sequence = B D F H J, operation = move two letters forward in the alphabet), the second five problems required the identification of two operations (e.g., sequence = B Q D P F O H, operations = move to letters forward on odd letters, move one letter back on even letters), the third set of five problems encapsulated three operations and so on. Participants received a score of 1 for each problem that was responded to correctly. Separate performance scores for each complexity level were derived by calculating the average number of correct responses out of five at that level. Baseline performance in our task is represented in terms of performance on the simpler blocks of problems and the shift in task context is represented by progression to more complex blocks. Performing well on the subsequent blocks requires transferring strategies for solving problems in the simpler contexts and adapting them to the more complex contexts. In line with our conceptualization of adaptive performance as the extent to which performance

is maintained in the face of increasing task complexity, we used to each participant's score on each block to determine the change in performance as a function of changing complexity level for each participant (as described in the Results section), which, in turn served as the criterion measure of adaptive performance.

### *Data Analysis*

To test our hypotheses we conducted a series of hierarchical linear modeling analyses using the HLM software package (Raudenbush, Bryk, Cheong, & Congdon, 2000). We conducted our analyses following the hypothesis testing procedures of Raudenbush and Bryk (2002) and we use their notation for three-level models to present the findings. To model momentary conscientiousness as a latent construct, we used three-level models in which the momentary conscientiousness items (level 1) were clustered within occasions of measurement (level 2) which in turn were clustered within people (level 3). In these analyses, level 1 is used to model the observed variability in the momentary conscientiousness items as a function of a latent momentary conscientiousness score and error variance. Levels 2 and 3 of the models are then used to estimate and account for within-person and between-person variability in the latent momentary conscientiousness construct. This approach allows us to isolate the between-item variability from that associated with latent momentary conscientiousness, to test the statistical significance of the within-person variability in latent momentary conscientiousness, and to obtain a reliability estimate for the assessment of momentary conscientiousness at the occasion level (see Raudenbush & Bryk, 2002, Chapters 8 and 11, for a more extensive treatment of the benefits and procedures for modeling latent constructs within a hierarchical linear modeling framework). The specific analyses that we performed to test each hypothesis are discussed in the results section.<sup>1</sup>

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<sup>1</sup> As the HLM software does not accommodate four-level hierarchical linear models, we were not able to perform analyses in which the different organizations constituted a fourth level of analysis. However, to examine organization membership effects, we conducted three-level analyses in which occasions, persons, and organizations constituted the three levels. These analyses revealed little evidence for organization effects, and

## Results

Table 1 presents the results of a fully unconditional analysis in which the total variability in the four momentary conscientiousness items was partitioned into three components: (i) variability between people in latent momentary conscientiousness, (ii) variability within person in latent momentary conscientiousness, and (iii) error variance. Between-person variability was significantly different from zero ( $\tau_\beta = 0.29$ ,  $\chi^2 = 1591$ ,  $p < .01$ ). That is, individuals differ from each other in how conscientiously they typically behave at work. More importantly, within-person variability was also statistically significant ( $\tau_\pi = 0.75$ ,  $\chi^2 = 16991$ ,  $p < .01$ ), accounted for the majority (72%) of the total variability in latent momentary conscientiousness, and could be reliably assessed (see Table 1). These findings are an important prerequisite for the analyses that are to come as they indicate that individuals display substantial variability in how conscientiously they behave from occasion to occasion at work, a result that replicates findings obtained with student samples (e.g., Fleeson, 2001; Heller, Komar, & Lee, 2007).

*Hypothesis 1: The Contingency of Momentary Conscientiousness on Task Demand*

To examine the contingency of momentary conscientiousness on task demand, we conducted a random coefficient regression analysis in which we entered the task demand variable (centered around each individual's mean) as an independent variable at level 2. The results of this analysis are presented in the top panel of Table 2. Task demand was significantly and positively related to momentary conscientiousness ( $\gamma_{010} = 0.33$ ,  $t = 16.82$ ,  $p < .01$ ) and accounted for 24% of the total variance in the latent construct. This finding supports Hypothesis 1: For the typical individual, momentary conscientiousness is contingent on task demands; momentary conscientiousness increases when tasks are perceived as more demanding, and decreases when tasks are perceived as less demanding.

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the pattern of significant results remained essentially unchanged. Consequently, for simplicity, we do not present these analyses as part of our results.

*Hypothesis 2: Between-Person Differences in Task-Contingent Conscientiousness*

In the random coefficient regression analysis reported above, the level 2 intercepts and slopes were allowed to vary randomly at level 3, which in turn allowed us to estimate between-person variability in the task-contingent conscientiousness effect. In support of Hypothesis 2, variability in the slopes (i.e., variability in task-contingent conscientiousness) was statistically significant ( $\tau_\beta = 0.032$ ,  $\chi^2 = 480.27$ ,  $p < .01$ ). Consequently, individuals differ in how strongly they respond to changing task demands. To further clarify the nature of the between-person differences, we estimated the plausible range of slopes as those that fall within 95% of the typical slope (i.e.,  $\pm 1.96$  standard deviations). The slopes range from  $-.02$  to  $.68$ , indicating that for the vast majority of individuals an increase in task demand is associated with an increase in momentary conscientiousness (i.e., for most people task-contingent conscientiousness takes on a positive value). However, individuals do differ markedly in the magnitude of their within-person contingencies, in that individuals at the upper end of the range are highly responsive to increasing task demand, whereas those at the lower end are either unresponsive to an increase in task demand or else respond by (slightly) decreasing momentary conscientiousness.

We estimated the stability of individual differences in task-contingent conscientiousness over two non-overlapping time periods. To derive the stability coefficient, we reconducted the random coefficient regression analysis separately for the first half and second half of each participant's data and correlated the empirical bayes estimates of each person's slopes across the two halves. The stability coefficient is positive and statistically significant ( $r = .52$ ,  $p < .01$ ), indicating that individuals who have higher levels of task-contingent conscientiousness based on the first half of their responses also tend to have higher task-contingent conscientiousness for the second half of their responses. These results

provide evidence that between-person differences in task-contingent conscientiousness reflect characteristic ways that individuals respond to situations.

*Hypotheses 3 and 4: Trait Conscientiousness and Need for Cognition as Antecedents of Task-Contingent Conscientiousness*

To test the effects of trait conscientiousness and need for cognition on task-contingent conscientiousness, we conducted intercept- and slope-as-outcome regression analyses. In our first analysis, we entered trait conscientiousness as a predictor of the intercepts (i.e., mean momentary conscientiousness) and slopes (i.e., task-contingent conscientiousness) at level 3 (see middle panel of Table 2). Trait conscientiousness was significantly and positively related to mean momentary conscientiousness ( $\gamma_{001} = .12, t = 2.01, p < .05$ ), indicating that individuals who score higher on trait conscientiousness tend to report higher typical levels of momentary conscientiousness. (The correlation coefficient corresponding to this relationship was  $r = .18$ , which indicates a relatively small effect size). Moreover, in support of Hypothesis 3a, we observed a negative relationship between trait conscientiousness and task-contingent conscientiousness ( $\gamma_{011} = -.05, t = 2.30, p < .05$ ). Thus, individuals who score high on trait conscientiousness tend to have conscientious responses that are less contingent on task demands. Nevertheless, the amount of variability in task-contingent conscientiousness remained statistically significant after controlling for trait conscientiousness ( $\tau_\beta = 0.030, \chi^2 = 450.43, p < .01$ ). Furthermore, the stability of these (trait conscientiousness adjusted) task-contingent conscientiousness effects (calculated on the two halves of each participant's data) remained high ( $r = .53, p < .01$ ). Consequently, in support of Hypothesis 3b, there is statistically significant and stable variability in task-contingent conscientiousness that is not accounted for by trait conscientiousness.

In a second analysis, need for cognition was entered as a level 3 predictor along with trait conscientiousness (see bottom panel of Table 2). In support of Hypothesis 4, it can be

seen that need for cognition is positively and significantly related to the task-contingent conscientiousness ( $\gamma_{012} = .11$ ,  $t = 3.05$ ,  $p < .01$ ), accounting for 12% incremental variance in the task-contingent conscientiousness over and above what is accounted for by trait conscientiousness.

*Hypothesis 5: Validity of Task-Contingent Conscientiousness for Predicting Adaptive Performance*

Hypothesis 5 was tested in two stages. First, to obtain our criterion measure of adaptive performance we conducted a two-level hierarchical linear modeling analysis in which performance on each block of items on the adaptive performance task was regressed on the complexity level of the block at level 1 (i.e., the within-person effect of complexity on performance), and in which the complexity-performance slope was allowed to vary randomly at level 2. This analysis yielded estimates of the extent to which each person maintained (or improved) their performance as complexity increased (i.e., the randomly varying level 2 slopes) which were then used as criterion scores in the subsequent analyses. The criterion scores along with the trait conscientiousness scores, need for cognition scores and the task-contingent conscientiousness scores (that were derived as part of the random coefficients regression analysis used to test H2) were then used as part of a standard regression analysis to examine the incremental predictive validity of task-contingent conscientiousness over and above trait conscientiousness and need for cognition. The findings from this latter analysis are presented in Table 3.<sup>2</sup> Task-contingent conscientiousness accounts for statistically significant variability in the criterion ( $\beta = .23$ ,  $t = 2.44$ ,  $p < .05$ ,  $\Delta R^2 = 5\%$ ), holding constant the effects of the other two predictors. Thus, in support of Hypothesis 5, task-contingent

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<sup>2</sup> Two of the 123 participants who had completed the experience sampling activity were not included in this analysis. One participant had not completed the adaptive performance task and the second represented an outlier with respect to the criterion measure.

conscientiousness predicts adaptive performance independently of trait conscientiousness and need for cognition.<sup>3</sup>

### Discussion

The present research examined the viability of incorporating task-contingent units into the study of personality at work, using task-contingent conscientiousness as an illustrative example. Our findings were generally supportive of our hypotheses. Specifically, we found that: (i) self-reports of momentary conscientiousness vary within individuals in accordance with the level of task demand that is being experienced; (ii) there are significant and stable differences between individuals in task contingent conscientiousness; that is, in the extent to which (self-reported) momentary conscientiousness is contingent on task demand; (iii) task-contingent conscientiousness is distinct from (though related to) trait conscientiousness; (iv) need for cognition accounts for variance in task-contingent conscientiousness over and above the effects of trait conscientiousness; and, (v) task-contingent conscientiousness predicts adaptive performance on a cognitive task independently of the effects of trait conscientiousness and need for cognition. Taken together, these findings suggest that task-contingent conscientiousness captures a meaningful aspect of personality in the workplace that is distinct from the associated trait.

### *Theoretical Implications*

Several theoretical implications stem from the present findings. First, our results have bearing on research that attempts to account for behavior at work as a function of personality. To date the majority of studies along this line have focused on accounting for between-person differences in important work outcomes as a function of between-person differences in traits (e.g., Barrick et al., 2001). However, the large amount of within-person variability in momentary self-reports of conscientiousness that was observed in the present study highlights

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<sup>3</sup> We also reconducted this analysis controlling for scores on the Advanced Progressive Matrices (APM) that had been collected as part of baseline assessments. The incremental effect of task-contingent conscientiousness remained significant even after the APM was entered into the analysis ( $\beta = .18, p < .05$ ).

a constraint on the power of traits to account for variability in conscientious behavior. Trait units are constant within the person; they describe between-person differences in tendencies to behave in a particular way, however by themselves they do not account for variability in behavior within a given person (Fleeson, 2001). Similarly, situational variables that are constant within a person such as job autonomy (Barrick & Mount, 1993) or reward structure (Stewart, 1996) do not account for within-person variability in behavior. Rather, an integrative approach is required that incorporates dynamic constructs such as momentary cognitions, emotions and behaviors and shifting situational variables into the study of personality at work. In this way, one can account for both the between- and within-person variability in behavior that occurs in organizational settings.

Second, our findings provide support for the cognitive nature of personality. Within a dynamic approach to personality, task-contingent effects are interpreted in terms of the underlying knowledge structure that links specific task cues to specific responses (see Linville & Clark, 1989). However, an alternative non-cognitive interpretation for task-contingent effects is that they represent the effects of a neurobiological variable, such as that identified with trait conscientiousness (Depue, 1995), that has a general effect on the individual's reactivity to situations. Although trait conscientiousness was related to task-contingent conscientiousness in the present study, we also found that stable differences between people in task-contingent conscientiousness remain after controlling for the trait. Consequently, trait conscientiousness by itself does not explain the differences in task-contingent conscientiousness between people. Moreover, we found that a large proportion of the variance in task-contingent conscientiousness that is not explained by trait conscientiousness can be accounted for by individual differences in need for cognition. This finding provides support for the cognitive nature of the contingencies in that it suggests that the tendency to engage in effortful cognitive activity—a factor that we have argued



determines the richness of the underlying knowledge structure—is positively related to task-contingent conscientiousness.

What are the specific psychological processes that underlie between-person differences in task-contingent conscientiousness? Although our study did not directly address this issue, one possibility is that differences in the strength of the contingencies reflect differences in the tendency to detect changing task level. In other words, the momentary conscientiousness of some individuals may be less contingent on task demand than that of others because they fail to perceive some tasks as more demanding than others. To test this possibility, we computed the standard deviation of the task demand ratings for each individual and correlated this with the corresponding task-contingent conscientiousness slopes. The corresponding correlation ( $r = -.01$ ) was non-significant and small in magnitude, suggesting that individual differences in the task-contingent effects observed in this study do not simply reflect differences in sensitivity to changing task level. Rather, the differences are more likely to reside in the specific ways in which cognitive and affective units interact within each person to evoke a given response for a given situational cue. In this regard, we note that similar task-contingent effects do not necessarily indicate similar underlying processes. For example, whereas one individual may display high levels of task-contingent conscientiousness because the task evokes thoughts of failure, feelings of anxiety and anxiety-avoidance goals, a second individual may show an equally high level of task-contingent conscientiousness because the task is framed as a learning opportunity, evokes feelings of enthusiasm and activates a learning goal. A direction for future research will be to further clarify the nature of the underlying processes for different individuals and the extent to which they contribute to individual differences in task-contingent effects.

The present results also provide insight into how trait conscientiousness is expressed at work. Previous research has established conscientiousness as the strongest Big Five

predictor of job performance (e.g., Barrick et al., 2001). Individuals who are high on conscientiousness are characterized by many attributes that are likely to be advantageous in work settings, such as higher self-efficacy (Lee & Klein, 2002), better goal-setting behavior (Barrick et al., 1993), and greater accomplishment striving (Barrick, Stewart, & Piotrowski, 2002). In line with these previous positive findings, the present study found that individuals who score higher on trait conscientiousness are more likely to report engaging in work tasks in an efficient, effortful, systematic and focussed way (i.e., they report higher average levels of momentary conscientiousness). However, the magnitude of this relationship was at best small to moderate, which suggests that trait conscientiousness is not simply reflected as the average level of momentary conscientiousness. Moreover, the present results point to a potentially negative consequence of conscientiousness, namely, that highly trait conscientious individuals were less likely to adjust their reported conscientious behavior in response to changing task demands than their less conscientious colleagues. Several researchers have proposed that conscientious individuals may be more rigid and less adaptable than their less conscientious colleagues in work settings (see Griffin, 2003) and some supporting evidence comes from laboratory studies (LePine, 2003; LePine et al., 2000). The present result suggests the rigidity of highly conscientious individuals also manifests in their every day behavior at work, and therefore provides a possible explanation for why trait conscientiousness shows inconsistent relationships with performance in jobs that require adaptability (Griffin & Hesketh, 2005).

### *Practical Implications*

From a practical perspective, there are at least two potential benefits of incorporating task-contingent units into the study of personality at work. The first relates to the predictive function of personality and its use for making promotion decisions. Within work settings personality variables are among the most frequently used psychological tests worldwide (e.g.,

Ryan, McFarland, Baron, & Page, 1999), yet their validity for predicting work outcomes is at best low to moderate, both in an absolute sense (e.g., Hurtz & Donovan, 2000) and relative to other instruments (Schmidt & Hunter, 1998). In the present study we found that task-contingent conscientiousness provided incremental validity for predicting a measure of adaptive performance over and above traditional trait measures. In this regard, contingent units may capture individual differences that are not easily assessed by traditional trait measures but that are relevant for predicting performance outcomes. For example, current personality-based measures of adaptability rely on self-report items that can be transparent (e.g., “Adapt easily to new situations”, 6FPG Adaptability scale, Goldberg, 1999), and that have been shown to be prone to problems associated with faking good in applied settings (see Griffin, 2003). Contingent units that are operationalized as regression slopes are presumably less transparent because they require an inference about the relationship between two variables. Therefore they may be less susceptible to faking, potentially providing a less distorted measure of the construct of interest. Future research is required to investigate the susceptibility of contingent units to faking and to evaluate their predictive validity for a broader range of training and job performance criteria.

In addition to their potential predictive benefits, contingents units also lend themselves to applications that focus on behavioral change in organizational settings. Despite the widespread application of personality instruments for selection and allocation decisions, there is comparatively little research on how to develop those attributes that facilitate performance at work, or to minimize the effects of maladaptive attributes. Conceivably, this is because the focus of the research to date has been on personality traits—which are assumed to be relatively fixed once established (e.g., McCrae & Costa, 1999)—rather than the within-person processes that are the causes of an individual’s actions (Cervone, Shadel, Smith, & Fiori, 2006). Contingent units direct the focus of personality research to aspects of the person

that are more amenable to change and that have often been the focus of clinical interventions, such as cognitive appraisals, emotional reactions, and self-regulatory skills. Moreover, to the extent that the contingent effects reflect underlying knowledge structures, the same techniques that have been employed to develop expertise in specific domains such as chess or computer programming (see Eysenck & Keane, 1995) may be applied for the purposes of personality development.

### *Limitations*

We note several limitations of the present study that may be addressed in a future study. First, due to restrictions on the number of items that can feasibly be included in experience sampling studies, our task demand and momentary conscientiousness scales contained a small number of items. In particular, we only assessed a subset of the behaviors that are encompassed within the conscientiousness domain (see Costa & McCrae, 1992), focusing on the responses that were most closely linked to the task facilitation properties of the domain. However, conscientiousness also includes behaviors that are relevant when interacting with others, such as reliability, punctuality and ethicality (e.g., see Costa & McCrae, 1992). Furthermore, other personality dimensions such as extraversion also show a large amount of within-person variability that is likely to be contingent on interpersonal encounters (e.g., Fleeson, 2001). Consequently, one aim for future research will be to evaluate the replicability of our findings across other situational characteristics and behavioral outcomes.

Second, as pointed out by an anonymous reviewer, the momentary conscientiousness items were qualified with the term “on this task” and therefore assess task-specific conscientiousness as opposed to being generic measures of momentary conscientiousness. On the one hand, this operationalization is more closely aligned with our interest in the task contingency of conscientiousness as it excludes expressions of momentary conscientiousness

that are unrelated to the task or directed at avoiding the task. On the other hand, given that the task demand items were also qualified with “this task”, the relationship between momentary conscientiousness and task demand may have been somewhat inflated by the phrasing of the momentary conscientiousness items. An alternative approach would have been to use items that assess momentary conscientiousness without reference to the task that is being performed (e.g., “Right now I am working hard”). A future study that replicates the present research using a more generic measure of momentary conscientiousness will shed light on the extent to which a phrasing effect occurs.

Third, our experience sampling data was collected in a field setting in which individuals responded to signals as part of their normal day to day work lives. Although this contributes to the ecological validity of the study, the correlational nature of the resulting data precludes conclusions about the causal nature of the relationships. Furthermore, the use of self-report data for assessing both the situational cues and the behavioral responses introduces the possibility that the contingent effects are impacted by common-method bias. Consequently, it is important that field-based experience sampling studies be supplemented with laboratory studies that facilitate the experimental manipulation of situational variables and observations on objective measures of behavior.

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Table 1

*Results of the Fully Unconditional Analysis: Between- and Within-Person Variability in Latent Momentary Conscientiousness.*

Variance Component	Variance Estimate	%	Reliability
Between-Person ( $\tau_\beta$ )	0.29**	28%	0.91
Within-Person ( $\tau_\pi$ )	0.75**	72%	0.72
Error ( $\sigma^2$ )	1.17		

Notes.

Level 1 model:  $Y_{ijk} = \pi_{0jk} + e_{ijk}$ , where  $e_{ijk} \sim N(0, \sigma^2)$  and  $Y_{ijk}$  is person  $k$ 's score on momentary conscientiousness item  $i$  on occasion  $j$ .

Level 2 model:  $\pi_{0jk} = \beta_{00k} + r_{0jk}$ , where  $r_{0jk} \sim N(0, \tau_\pi)$

Level 3 model:  $\beta_{00k} = \gamma_{000} + u_{00k}$ , where  $u_{00k} \sim N(0, \tau_\beta)$

% refers to the percentage of variability in the latent construct that is accounted for by between- versus within-person components.

\*\*  $p < .01$ .



Table 2

*Results of the Random Coefficients Regression (RCR) Analysis and the Intercept- and Slope-As-Outcome Regression (ISAOR) Analyses*

Variable	Parameter Estimate	SE	t	$\Delta R^2$
RCR Analysis				
Task demand ( $\gamma_{010}$ )	0.33	0.02	16.81**	24%
ISAOR Analysis 1				
Intercept-as-outcome				
Trait conscientiousness ( $\gamma_{001}$ )	0.12	0.06	2.01*	1%
Slope-as-outcome				
Trait conscientiousness ( $\gamma_{011}$ )	-0.05	0.02	-2.29*	6%
ISAOR Analysis 2				
Intercept-as-outcome				
Trait conscientiousness ( $\gamma_{001}$ )	0.12	0.06	2.02*	1%
Need for cognition ( $\gamma_{002}$ )	-0.02	0.09	-1.71	0%
Slope-as-outcome				
Trait conscientiousness ( $\gamma_{011}$ )	-0.06	0.02	-2.93**	10%
Need for cognition ( $\gamma_{012}$ )	0.11	0.03	3.39**	12%

Notes.

Level 1 model (for all analyses):  $Y_{ijk} = \pi_{0jk} + e_{ijk}$

Level 2 model (for all analyses):  $\pi_{0jk} = \beta_{00k} + \beta_{01k} \times (\text{Task Demand}) + r_{0jk}$

Level 3 model for RCR Analysis:  $\beta_{00k} = \gamma_{000} + u_{00k}$  and  $\beta_{01k} = \gamma_{010} + u_{01k}$

Level 3 model for ISAOR Analysis 1:  $\beta_{00k} = \gamma_{000} + \gamma_{001} \times (\text{Trait Conscientiousness}) + u_{00k}$  and

$\beta_{01k} = \gamma_{010} + \gamma_{011} \times (\text{Trait Conscientiousness}) + u_{01k}$

Level 3 model for ISAOR Analysis 2:  $\beta_{00k} = \gamma_{000} + \gamma_{001} \times (\text{Trait Conscientiousness}) + \gamma_{002} \times (\text{Need For Cognition}) + u_{00k}$  and  $\beta_{01k} = \gamma_{010} + \gamma_{011} \times (\text{Trait Conscientiousness}) + \gamma_{012} \times (\text{Need For Cognition}) + u_{01k}$

For the random coefficients regression analysis and when intercepts are outcomes,  $\Delta R^2$  is expressed as a percentage of the total variability in latent momentary conscientiousness; when slopes are outcomes,  $\Delta R^2$  is expressed as a percentage of the total variability in the task demand effect.

\*  $p < .05$

\*\*  $p < .01$

Table 3

*Regression of the Adaptive Performance Criterion on Trait Conscientiousness, Need for Cognition, and Task-Contingent Conscientiousness.*

Variable	$\beta$	t	$\Delta R^2$
Trait conscientiousness	.03	0.27	0%
Need for cognition	.04	0.39	0%
Task-contingent conscientiousness	.23	2.44*	5%

\*  $p < .05$